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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09 974,584	10 09 2001	Shih-Ming Wang	67,200-318	8284

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EXAMINER

PHAM, LONG

ART UNIT PAPER NUMBER

2823

DATE MAILED: 09 13 2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/974,584

Applicant(s)

WANG ET AL.

Examiner

Long Pham

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art (AAPA) of this application in view of Shiromizu (JP '192) and Polinsky (US '059).

AAPA teaches a method for depositing an inter-metal-dielectric (IMD) or oxide layer on a semiconductor substrate by plasma chemical vapor deposition (CVD) comprising the steps of (see the Background of the Invention on pages 1-5 of this present application) :

conducting a plasma CVD process on a semiconductor substrate and depositing said inter-metal-dielectric layer and further comprising a step of flowing precursor gases of silane and nitrous oxide into the plasma CVD chamber for depositing said IMD.

However, AAP fails to teach that the semiconductor substrate is heated to a temperature greater 300 degrees celcius in the same chamber before the dielectric or oxide layer is formed as recited in present claims 1, 2, 3, 4, 9, and 10.

Shiromizu teaches a process in which the surface of a semiconductor substrate is heated to a temperature higher than 400 degrees celcius before a oxide layer is formed on the surface of the substrate. See the English abstract.

It would have been obvious to one of ordinary skill in the art of making semiconductor devices to heat the surface of the substrate to a temperature higher than 400 degrees celcius before forming the oxide layer on the surface of the substrate in the method of AAPA because doing so the undesired organic substance on the surface of the substrate can be removed. AAPA and Shiromizu fail to teach that the surface of the substrate is heated for a period of greater than 30 seconds as recited in present claims 1, 3, and 5.

Polinsky teaches that the surface of a semiconductor substrate is heated before a layer is formed on the substrate surface to prevent cracking. See col. 1, lines 1-20.

It would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal range for the heating time through routine experimentation and optimization to prevent cracking.

3. Claims 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art (AAPA) of this application in view of Shiromizu (JP '192) and Polinsky (US '059).

AAPA teaches a method for depositing an oxide or inter-metal-dielectric (IMD) layer on a semiconductor wafer comprising the steps of (see the Background of the Invention on pages 1-5 of this present application) : Depositing a silicon oxide layer on said wafer by plasma enhanced CVD and further comprising a step of flowing precursor gases of silane and nitrous oxide into the plasma CVD chamber for depositing said oxide or IMD layer. However, AAP fails to teach that the semiconductor substrate is heated to a temperature greater 300 degrees celcius in the same chamber before the dielectric or oxide layer is formed as recited in present claims 11, 12, 13, and 14.

Shiromizu teaches a process in which the surface of a semiconductor substrate is heated to a temperature higher than 400 degrees celcius before a oxide layer is formed on the surface of the substrate. See the English abstract.

It would have been obvious to one of ordinary skill in the art of making semiconductor devices to heat the surface of the substrate to a temperature higher than 400 degrees celcius before forming the oxide layer on the surface of the substrate in the method of AAPA because doing so the undesired organic substance on the surface of the substrate can be removed. AAPA and Shiromizu fail to teach that the surface of the substrate is heated for a period of greater than 30 seconds as recited in present claims 13 and 14.

Polinsky teaches that the surface of a semiconductor substrate is heated before a layer is formed on the substrate surface to prevent cracking. See col. 1, lines 1-20.

It would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal range for the heating time through routine experimentation and optimization to prevent cracking.

With respect to claim 16, AAPA further teaches the step of cleaning the surface of the substrate or wafer by a nitrous oxide (N₂O) plasma.

AAPA in view of Shiromizu and Polinsky fails teach maintain the chamber pressure at less than 10⁻² Torr before deposition of the oxide layer as recited in present claim 15.

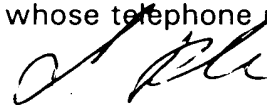
it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal range for the chamber pressure before the formation of the oxide layer through routine experimentation and optimization to obtain optimal or desired device performance because the chamber pressure is a result-effective variable and there is no evidence indicating that the chamber pressure is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long Pham whose telephone number is 703-308-1092. The examiner can normally be reached on M-F, 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-4082 for regular communications and 703-746-4082 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Long Pham
Primary Examiner
Art Unit 2823

L. P.
September 6, 2002